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09/675,778	09/29/2000	Lars Langemyr	CMM-00101	8229
<div>7590 10/09/2007 GUNNAR G. LEINBERG, ESQ. NIXON PEABODY LLP CLINTON SQUARE P.O. BOX 31051 ROCHESTER, NY 14603-1051</div>			<div>EXAMINER SHARON, AYAL I</div>	
			<div>ART UNIT 2123</div>	<div>PAPER NUMBER</div>
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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/675,778  
Filing Date: September 29, 2000  
Appellant(s): LANGEMYR ET AL.

\_\_\_\_\_  
Peter J. Prommer  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 6/27/07 appealing from the Office action mailed 9/12/06.

**(1) Real Party in Interest**

The real party in interest in this appeal is COMSOL, Inc., a corporation having offices at 1 New England Executive Park, Suite 350, Burlington, Massachusetts 01803, and COMSOL AB, a company having offices at Tegnérgatan 23, SE-111 40 Stockholm, Sweden.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

**Claims 1, 3-87, and 89-101 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

FEMLAB Model Library. Version 2.2. (c) 1994-2001 by COMSOL AB. pp.i-iii. (Cited by Appellant in IDS filed 02/13/2006).

**(9) Grounds of Rejection**

See the above section (6), "Grounds of Rejection to be Reviewed on Appeal."

**(10) Response to Argument**

The Examiner finds that all of the claims in the application are held to be non-statutory under 35 U.S.C. § 101.

One may not patent every "substantial practical application" of an idea, law of nature or natural phenomena because such a patent "in practical effect be a patent on the [idea, law of nature or natural phenomena] itself." Gottschalk v. Benson, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972).

The claims in Gottschalk were directed to a mathematical method running on a computer: converting binary-coded-decimal (BCD) numerals into pure binary numerals for use with general purpose digital computer of any type. Gottshcalk at 65.

The Supreme Court held in Gottschalk that "one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD

numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." Gottshcalk at 71-72.

Therefore, whether a claim recites a machine implemented process is not determinative of whether that process claim is statutory. Thus, a claim that is nothing more than a machine-implemented abstract idea is invalid.

Moreover, the Supreme Court also held that "[h]ere the 'process' claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion. The end use may (1) vary from the operation of a train[,] to verification of drivers' licenses[,] to researching the law books for precedents[,] and (2) be performed through any existing machinery or future-devised machinery or without any apparatus." Gottshcalk at 68.

The Examiner finds that the claims in the instant application share the same characteristics as the claims in Gottshcalk. The claims in the instant application are directed to a machine-implemented abstract idea. These claims are: (1) so abstract and sweeping as to cover both known and unknown uses of the underlying math, (2) so abstract and sweeping as to be applicable to a wide variety of unrelated applications, and (3) can be performed through any existing machinery or future-devised machinery or without any apparatus.

For example, independent claim 1 recites:

determining a set of partial differential equations for each of the two or more selected application modes, parameters of the partial differential equations being physical quantities of corresponding ones of said plurality of systems" and

forming said combined system of partial differential equations using partial differential equation systems associated with said plurality of systems.

outputting a model of said combined physical system based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems, whereby the model represents a mathematical expression of the physical quantities of the combined physical system.

The outputs of independent claims 1, 42, and 82 are mathematical "models", which are defined in the claim as follows: "whereby the model represents a mathematical expression of the physical quantities of the combined physical system."

Therefore, the claims cover a very wide range of unrelated "substantial practical applications (as defined in Gottschalk). According to the table of contents of the FEMLAB Model Library (Cited by Appellant in IDS filed 02/13/2006), and according to Appellant's own admission in the Appeal Brief (see p.4), such mathematical models with combined systems of partial differential equations can currently be used to represent the following types of unrelated physical systems:

- (1) Acoustics Models
- (2) Chemical Engineering Models
- (3) Electromagnetic Models
- (4) Fluid Dynamics Models
- (5) Geophysics Models

- (6) Heat Transfer Models
- (7) Multi-disciplinary and Multi-physics Models
- (8) Semiconductor Device Models
- (9) Structural Mechanics Models
- (10) Wave Propagation Models.

This is merely a partial list of the types of unrelated mathematical models that use a set of partial differential equations for each of the two or more selected application modes. All are covered by the claims in this patent application. The claims also cover all mathematical models that are unknown today but may become known in the future.

In the Appeal Brief (see p.9), the Appellant argues that “[t]he claimed invention allows engineers to model, test, and predict the response of a physical system without the need for the system to be built.” While this is true, the claims are not limited in the type of physical system, the type of response being modeled, nor in the details of the model itself (aside from being a combined set of partial differential equations).

Moreover, the Appellant’s Appeal Brief (see p.10) cites to the Court of Appeals for the Federal Circuit (CAFC) decisions in State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F.3d 1368 (Fed. Cir. 1998) (upholding a claim to a computer-calculated price for one share of a mutual fund). While State Street is a more recent case, it was decided by a lower court, and therefore does not overrule the Supreme Court decision in Gottshalk.

Moreover, the Examiner interprets the State Street decision differently than the Appellant does. The Appellant interprets State Street as upholding claims that input and output numbers, so long as the claim produces a “useful, concrete and tangible result.” The Examiner reads the case very differently. The Examiner interprets the holding in State Street to be narrow in scope: that a dollar value output is a “concrete, useful, tangible” result. The decision says so expressly (See State Street at 1373. Emphasis added):

Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, **because it produces “a useful, concrete and tangible result”- a final share price momentarily fixed for recording and reporting purposes** and even accepted and relied upon by regulatory authorities and in subsequent trades.

The Examiner notes that the CAFC has upheld other computer-implemented algorithm claims, where the outputs were narrowly claimed. AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999) (upholding claims directed to a long-distance telephone billing process containing mathematical algorithms that generated PIC codes); In re Alappat, 33 F.3d 1526 (Fed. Cir.1994) (upholding claims directed to computer-implemented mathematical algorithms that generated smooth waveform display on a rasterized monitor); Arrhythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed.Cir.1992) (upholding claims directed to the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations that output the condition of a patient's heart).



The common link between those cases was a test to determine whether the claimed invention produces a “**useful, concrete and tangible result.**” State Street at 1373. In comparison, independent claims 1, 42 and 82 in the instant application recite, a method for:

outputting a model of said combined physical system based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems, whereby the model represents a mathematical expression of the physical quantities of the combined physical system.

The Examiner finds that the output of a mathematical model falls under the Gottschalk ruling, because it is a claim that “is so abstract and sweeping as to cover both known and unknown uses.” Examiner also respectfully disagrees with the Appellant in regards to the applicability of State Street. Examiner finds that “outputting a model of said combined physical system” is far too broad to constitute a “useful, concrete and tangible result.” Examiner finds that all of the claims in the instant application share this defect.

Finally, Appellant’s Appeal Brief (see p.11) argues that the Examiner’s withdrawal of 35 U.S.C. § 112, ¶1 lack of enablement rejections in a non-final office action presents sufficient grounds for withdrawing the 35 U.S.C. § 101 rejections. The Examiner respectfully disagrees. The two grounds of rejection are separate and distinct. While the specification does enable the implementation of math on a computer, as claimed, and therefore are enabled under 35 U.S.C. § 112, ¶1, the claims are also so broad that they claim all practical applications of the math, and are therefore invalid under 35 U.S.C. § 101.

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**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Ayal Sharon

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